

### ABSTRACT

The invention provides a lithographic method referred to as "dip pen" nanolithography (DPN). DPN utilizes a scanning probe microscope (SPM) tip (*e.g.*, an atomic force microscope (AFM) tip) as a "pen," a solid-state substrate (*e.g.*, gold) as "paper," and molecules with a chemical affinity for the solid-state substrate as "ink." Capillary transport of molecules from the SPM tip to the solid substrate is used in DPN to directly write patterns consisting of a relatively small collection of molecules in submicrometer dimensions, making DPN useful in the fabrication of a variety of microscale and nanoscale devices. The invention also provides substrates patterned by DPN, including submicrometer combinatorial arrays, and kits, devices and software for performing DPN. The invention further provides a method of performing AFM imaging in air. The method comprises coating an AFM tip with a hydrophobic compound, the hydrophobic compound being selected so that AFM imaging performed using the coated AFM tip is improved compared to AFM imaging performed using an uncoated AFM tip. Finally, the invention provides AFM tips coated with the hydrophobic compounds.